Clarke with the nerve-fibres which radiate in bundles from the grey matter of that region into the lateral column, and to show that some of the fibres with which these are related pass out transversely well into that area which is occupied almost exclusively (man) by fibres of the crossed pyramidal tract. Concerning some of the outlying cells in the more dorsal portion of the lateral column, the same inferences may be drawn; and some of them would seem to be connected with fibres of the posterior roots that curve round the lateral aspect of the caput cornu posterioris. Of the outlying cells in the posterior column, if they are outlying members of Clarke's group, the relations which they suggest for that group are—

i. That the group is connected *directly* with certain of the median fibres of the posterior spinal roots, namely, those which after an upward course in Burdach's column plunge into the grey matter of the base of the posterior horn.

ii. That some at least of the cells of that group are interpolated, more or less immediately, into the course of medullated nerve-fibres of large calibre.

The question naturally arises, May not these cells in the posterior column of the Mammalian cord represent the bipolar cells discovered by Freud,* in the cord of *Petromyzon Planeri*, to be in direct communication with fibres of the posterior roots? If so may Clarke's column be considered a portion of the ganglion of the posterior spinal nerve-root which has been retained in the interior of the spinal cord in the thoracic and certain other regions?

III. "On the Germination of the Seed of the Castor-oil Plant (*Ricinus communis*)." By J. R. Green, M.A., B.Sc., F.L.S., Professor of Botany to the Pharmaceutical Society of Great Britain. Communicated by Professor M. Foster, Sec. R.S. Received January 29, 1890.

(Abstract.)

The older views of the transformations of the reserve products of this plant, as advanced by Sachs and other writers, took account only of the oil present in the cells, and were briefly, that it undergoes by oxidation a conversion into carbohydrate, the idea of this change being chiefly based on the observation that as the oil disappears from the endosperm during germination, starch appears in various parts of the embryo. Later writers have suggested the existence of a ferment, splitting up the fat into glycerine and fatty acid, and the further transformation of the latter into the starch.

* Freud, 'Vienna Sitzungsberichte,' January, 1877.

The work embodied in this paper deals (*a*) with the agencies which, during germination, render the reserve materials available for the use of the embryo, (*b*) with the forms in which these are absorbed by it and the mode of their absorption, and (*c*) with the parts played in the process by the endosperm and the embryo respectively.

1. *The agencies at work.*—A ferment is found to exist as a zymogen in the resting seed, which is readily developed by warmth and weak acids into an active condition. The results of its activity are the splitting up of the fat with formation of glycerine and (chiefly) ricinoleic acid. Further changes, brought about by the protoplasm of the endosperm cells, form from the latter a lower carbon acid which, unlike ricinoleic acid, is soluble in water and is crystalline. These changes do not take place in the absence of free oxygen. A quantity of sugar also is formed, which appears to have the glycerine as its antecedent.

The proteids of the seed, which consist of globulin and albumose, are split up by another ferment, with formation of peptone and asparagin. This ferment resembles closely the ferment previously described by the writer as occurring in germinating lupin seeds.

2. *The forms in which the reserve materials are absorbed.*—Examination of the seeds during the whole course of absorption shows that the only products which enter the embryo are a crystalline acid, sugar, possibly some peptone, and asparagin. Consideration of the structure of the cotyledons, which are the absorbing organs, shows that the mode of absorption is always dialysis, a view antagonistic to that of Sachs, who has put forward the idea of a penetration of the cell walls by the unchanged oil. It follows from this that the starch seen by him and other observers in the tissues of the young embryo was the result of a re-formation from the diffusible bodies now traced.

3. *The relative influence of the endosperm and the embryo.*—The changes are found to be initiated in the endosperm, for they take place, though more slowly, when the embryo is carefully removed. The latter has, however, an influence upon the process, germination being more rapid when it, or even part of it, is left in contact with the endosperm. This is shown not to be due to simple removal of the products of the decompositions, but is rather to be regarded as due to a stimulus of a physiological nature caused by the commencing development of the embryo.

4. An additional point of interest in the progress of the germination is the liberation in the endosperm of a rennet ferment of considerable vigour. At present an explanation of the action of this is difficult, though experiments are still proceeding with a view to clearing it up.